Why do Businesses Need BI?

In the previous chapter, **business intelligence** (**BI**) was introduced and a high-level overview of working of BI was provided apart from other topics. In this chapter, we will explore in detail about why businesses actually need BI. If you are a business owner, entrepreneur, or are part of a management team, this chapter will provide you enough knowledge to understand why your business or business unit actually need BI and help you understand what you are perhaps missing by not using BI in your organization. Readers will acquire knowledge on important topics such as key uses of BI, its additional benefits and importance, users of BI and the purposes they use it for, thereby building a good foundation on the concepts of BI. When summed up, all of these points answer the question why businesses actually need BI.

This chapter has been structured such that it first introduces the reader to the ways in which BI is currently used in various organizations and the processes that support the main uses. At the end of the chapter, the topic of evolution of BI is covered as it helps to relate to the approaches that were used in the past for achieving similar goals that are achieved with BI today. The confusions and misconceptions around business analytics, data analytics, and data mining are clarified in this chapter. Also, clear distinction is made between BI reporting and operational data transfer.

Structure

This chapter will cover the following topics:

- Introducing Walget – A retail chain example
- Main uses of BI
  - o Decision making
  - o Business performance management
  - o Finding opportunities and identifying problems
- Processes that support main uses of BI
  - o BI Reporting
    - ❖ BI Reporting versus operational data transfer
  - o Analytics
  - o Data mining
  - o Reporting vs analytics vs data mining in BI
- Importance of BI
- Why BI is a must have?
- Benefits of BI
  - o Side benefits of BI
- Which sectors use BI?
  - o Users of BI and purposes
- Evolution of BI

Objectives

Understanding the main uses of BI, processes that support main uses of BI, differences between those processes, and differences between BI reporting and operational data transfer. Understanding the importance of BI for businesses, side benefits and the reason why BI has become a must have for almost all businesses. Readers will also learn about various sectors or industries and types of businesses that use BI, BI user groups, and purposes for which those user groups use BI. Readers will also understand the evolution of BI.

Introducing Walget – A retail chain example

To be able to relate to the concepts discussed in this chapter and for better understanding, there is a need for us to connect to different business scenarios and examples. So we will introduce a fictional company. For the examples to be most

effective and reach wide audience, there is a need to provide examples that most of us would be familiar with. What better example than one from the retail sector, such as a supermarket that most of us are familiar. Therefore, we will consider a fictional company called *Walget Supermarkets* (Walget). Walget will be used wherever it is appropriate throughout the book from hereon. Even though Walget is a fictional company, the usage in all examples will be as though it were a real company.

We will consider that Walget is an international supermarket chain with more than 1000 stores/locations across 100s of cities, operating in multiple countries with more than 100,000 full-time employees. Walget also has an online store and a mobile app that was recently launched. Walget was started in the 1980s. It has grown several times in size in revenue and headcount both organically and by acquiring several of its competitors. Walget currently has multiple BI solutions mainly because of its acquisitions and also due to specific needs of the business. A simplified management structure of Walget is provided in *Figure 2.1*.
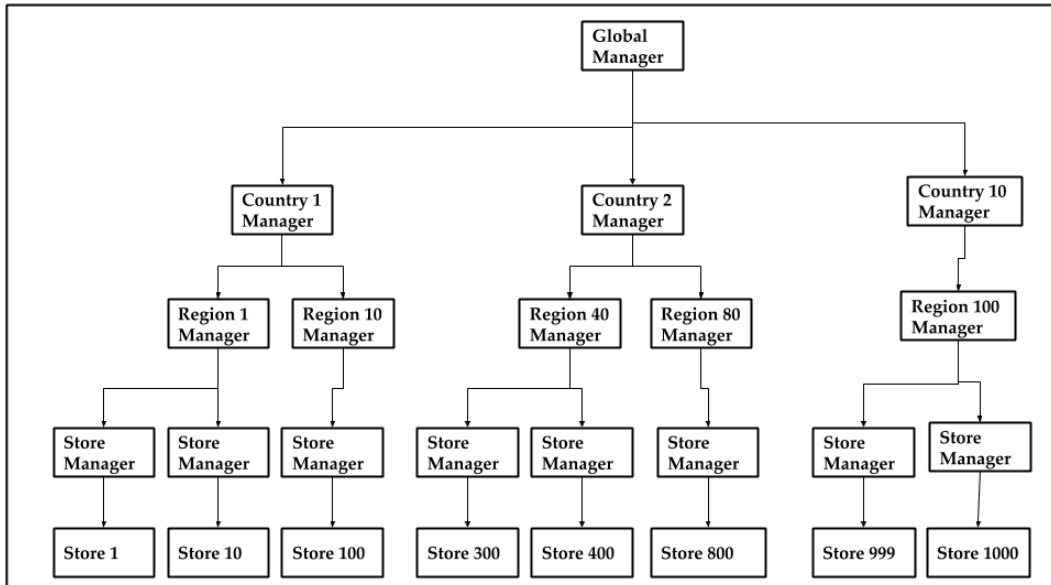

Figure 2.1: *Reporting structure of the supermarket chain*

As we can see in *Figure 2.1*, each store has a store manager, each regional manager has around 5 to 10 store managers directly reporting to them, each country manager has 5 to 10 regional managers reporting to them, and all of the country managers report to the global manager.

Now we know the business and a simplified management structure of Walget. What about data? What kind of data is available at Walget? A simple event (transaction) of a customer buying groceries from any of the Walget stores generates a lot of interesting data such as date and time of purchase, terminal used for payment, the

employee who served the customer, amount and currency of purchase, products purchased, type of payment (card, app or cash), card type and brand, store location, loyalty card number, discount, tax rate, loyalty points gained, returns, etc. Apart from the daily transaction data, data about stores, employees, suppliers, products, prices, inventory, campaigns, etc., are also maintained in different systems for regular business operations. All of these are still in their raw form and it is referred to as data. The following *Table 2.1* provides an overview of various groups of data stored by Walget.

Customers	Employees	Products	Stores	Suppliers
Demographic	Demographic	Product categories	Managers	Suppliers' contact details
Purchase history	Salary	Prices and costs	Location	
Return history	Attendance and leaves	Performance	Sales	Payments
Subscriptions	Training	Margins	Performance	Invoices
Behavior (both at brick and mortar and online stores)	Education	Offers	Costs	Returns
	Performance		Revenue	Offers
	Manager		Taxes	Contracts
Social media	Referrals		Opening hours	
	Compliance		Inventory	
	Job application		Social media	
	Social media			
Warehouse	**Transactions**	**Loyalty and campaigns**	**Syndicated data**	**Transport**
Capacity	Sales	Campaigns	Nielson	Trucks
Stocks	Returns	Membership management	IRI	Home delivery vehicles
				Schedules

Table 2.1: *Some of the groups of data stored by Walget*

As every business is different, different sets of data are collected by different businesses. The details in *Table 2.1* should not be considered as a comprehensive list of data entities but as one that covers the most common data entities in a retail chain. Starting from the next section, we will refer to Walget as and when necessary. Let's now start with the main uses of BI.

Main uses of BI

In order to answer this chapter's main question, why businesses actually need BI? The most practical and simple way is to first understand the applications of BI in modern day businesses. Because, once we answer what are the main uses and benefits of BI, it'll be easy to understand why other businesses also need BI.

There are the three main uses of BI. BI is used to support decision making, managing business performance, and to finding new hidden opportunities and identifying problems proactively. Every organization is different and not all organizations use BI for all of the 3 main purposes, but this doesn't mean that they won't use them in the future. It just means that that particular organization has prioritized some use cases over others. The following *table 2.2* captures a summarized view of each of the 3 main uses of BI.

Business Intelligence		
Decision making	**Business performance management**	**Finding business opportunities and identifying problems**
• Strategic • Tactical • Operational	• Track **key performance indicators** (**KPIs**) and metrics. • Monitor business at every level (team, department, and corporate).	• Analyze data to answer specific questions. • Find previously unknown trends, patterns, correlations, and anomalies to figure out next steps.

Table 2.2: Main uses of BI

In the following sections, we will discuss each of the 3 main uses in detail. But before proceeding, let's clarify what is the difference between KPIs (key metrics) and metrics (business metrics). All KPIs are metrics but all metrics are not KPIs. Only a selected few of the metrics that indicate business performance are grouped as KPIs. In a business, there can be hundreds of metrics, for example, number of users, number of visitors, number of likes, number of comments, number of enquiries, etc. These are all metrics and measuring these metrics is important, however, these metrics do not necessarily indicate that a business is growing profitably or meeting its business objectives.

Measuring KPIs allows a business to track whether the business is growing profitably or not and whether it is on track to achieve its business objectives or not. KPIs are the most important metrics using which performance of the organization can be

measured. KPIs can be at various levels. There can be departmental KPIs, team-level KPIs, enterprise-level KPIs, etc. Also, a metric considered as a KPI at one level may not necessarily be considered as a KPI at another level. For example, a department-level KPI such as training completion compliance ratio for the training department could be considered only as a metric at enterprise or corporate level and not as a KPI. KPIs are derived based on metrics. And KPIs at lower levels could be used as inputs to derive KPIs at higher levels in the organization. Usually, the number of KPIs is between 5 to 10. In case of Walget, the number of employees and the number of customers are metrics whereas sales per employee could be considered as a KPI if the business decides that it is one of the most important metrics which they should monitor regularly to ensure that their business is on track.

Decision making

With Walget as a backdrop, let's explore the first use of BI—business decision making. Decision making here refers to the support that BI provides to the decision makers (managers in this case) in making business decisions based on information and insights at all levels and all types of decisions such as strategic, tactical, and operational. The following *Table 2.3* lists a few scenarios from Walget where BI could support decision making:

Decision making		
Strategic	**Tactical**	**Operational**
• Which products should we invest in the long term? • In which locations should we launch new stores? • Which stores should we close down in the long run?	• Which promotion/campaign should we repeat or launch to meet yearly targets? • How many stores should we upgrade to new technology in phase 1?	• Which products should we stock for the holiday season? • How many part-time staff should we hire for the weekend? • Which products should be part of the clearance sale and what should be the discount percentage?

Table 2.3: Scenarios where BI is useful for decision making

In the preceding scenarios, the strategic decisions are made by the country managers together with the global manager, the tactical decisions are made by the region managers, and the operational decisions are made by the respective store managers.

Similarly, in other businesses, decision makers could be anyone from a CEO to department heads or operational staff. The scope of the decision changes based on

the roles. In the past, BI was used only to address strategic questions and therefore was solely used by the top management, however, modern businesses use BI at all levels. So, scope of decisions could be at different levels—team, department/unit, or at enterprise level. Some general examples of decisions to be made are given as follows:

- Which services should we further develop?
- Which sector/customer segment should we pay more attention to?
- Which market should we focus on?
- Which projects or programs or initiative should we continue or scrap or put on hold?
- Which departments should we focus on to reduce attrition rate?
- Which tools/technologies needs replacement to support current needs?

Let's now consider two examples, one where Walget and the other where a **business to business** (**B2B**) company must use BI to support their decision-making process.

Situation 1: Walget has to select a **software as a service** (**SaaS**) vendor from a list of vendors on the basis of best-fit price ranges. Price ranges quoted by vendors are dependent on the number of users that would use the SaaS application. To determine this, the procurement manager should know how many of the employees are potential users. At this point, the procurement manager could use BI to forecast the monthly/yearly growth rate of the number of users using actual numbers and based on this decide which vendor fits Walget's requirement. Here, the procurement manager is able to narrow down the list of SaaS vendors based on the information derived from data and eventually select (decide) a vendor based on the information provided by BI.

Situation 2: A B2B company intends to upgrade their top 10 customers to premium support to fulfil a strategic objective. Top 10 customers could be based on revenue or profit or some other metric or a combination of metrics that the company has decided. Using BI, as the information is already available in the BI solution, it would be relatively easy and less time consuming for the company to identify the right set of top 10 customers.

In both the cases we see that BI is supporting the decision makers based on facts rather than on gut feelings alone. However, note that as discussed in the previous chapter, decisions are not solely based on BI but depends on other factors and inputs as well. The decision to select a particular vendor in situation 1 may also depend on other parameters that are not available in BI, for example, one of the vendors could be a recommendation from the CEO based on his personal relationship. And in the second situation, it could be possible that one of those 10 customers are dropped from the list and the 11th one is included because the relationship manager is aware

(not in BI system) about one of those companies closing down shortly because of a financial crisis. These examples should also make it clear that BI supports decision makers in making business decisions and that it doesn't decide on its own.

Business performance management

The second main use of BI is in business performance management. At every successful business, managers at various levels monitor the business performance of the business unit they are responsible for. This is to keep track of what's happening in the business and to ensure that the performance is in line with their and the management's expectations (SLAs, objectives, etc.). Using the right set of metrics and KPIs managers get a quick overview of the performance of the business without necessarily having to go through the details. BI involves automation of the process of collecting, storing, and preparing data in an efficient and reliable way such that it is possible to derive the predefined metrics and KPIs and present it to the managers. BI supports two parts of business performance management—business performance monitoring and business goals achievement tracking. In *Table 2.4*, we can see examples for the two parts of the business performance management that BI supports in the context of Walget.

Business performance management	
Business performance monitoring	**Business goals achievement tracking**
To understand what's happening in the business.	To track whether the performance is in accordance with the set objectives and goals.
- How many shoppers per day? - How many employees are at work and how many on leave? - Sales trend—hourly, daily, weekly, etc. - How many orders were received? - How many orders are/were processed? - And other business metrics at various levels.	- Tracking KPIs and metrics at various levels. - Tracking adherence to SLAs. - Are sales increasing by 1% every day? - Are item returns less than 10% of daily sales? - Are fraudulent transactions less than set percentage? - Is the training completion percentage of all employees above or equal to 95%? - Is on-time delivery percentage more than 95%?

Table 2.4: Examples of use of BI in business performance management

Even though both business performance monitoring and business goals achievement tracking may seem similar, they are not, there is a difference. In business performance monitoring, the idea is to continuously monitor whatever is happening in the business, that is there is no set target whereas in business goals achievement tracking it includes comparison between the set targets and the actuals.

Finding opportunities and identifying problems

The third main use of BI is for finding opportunities and identifying problems proactively which otherwise would have been missed or remained unknown. The approach is to either explore and analyze the data to find something specific (answer a specific question) or to explore and analyze data with no specific questions but to find what is possibly hidden and available in the data. The main difference between using BI for business performance management and using BI for finding opportunities and identifying problems is that, in case of the former it is clearly known what needs to be measured and how it fits into the business strategy whereas in case of the latter the expected outcome is unknown. A few Walget examples of finding opportunities (O) or identifying problems (P) are listed as follows:

- A data analyst/BI analyst at Walget proactively finds or identifies:
  - A pattern that every alternate Wednesday between 4pm to 6pm there is a drop in the sales across 100s of stores. (P)
  - That after every successful campaign the next 2 campaigns (promotions) across stores are not as effective compared to expected outcome. (P)
  - That every alternate Friday there is a significant drop in employee work hours. (P)
  - That customers to whom gift cards were provided, came mostly along with family to the stores and this led to a significant increase in the average basket size of such customers. (O)
  - That job ads posted on Thursdays had a higher chance of finding the right candidate than any other weekday. (O)
  - Which customers are likely to churn out (stop buying from Walget)? (P)
  - Which store is likely to make a loss? (P)

Now the main uses of BI should be clear. All three main uses of BI explained in this section are supported by the process of reporting, analytics, and data mining both independently and combined. In the next section we will cover each of these three processes that support the main uses of BI.

Processes that support the main uses of BI

As aforementioned there are three important processes that support the uses of BI—BI reporting, business analytics, and data mining. These three processes in turn depend on sub processes such as **data warehousing** (**DWH**), data integration, metadata management, etc. However, we will limit the explanation to the first level processes and not go into details about the sub processes as these are beyond the scope of this chapter. These sub processes are covered in *Chapter 10: Demystify Tech, Tools and Concepts in BI. Figure 2.2* depicts the three main uses of BI supported by BI reporting, analytics, and data mining both independently and as a combination.
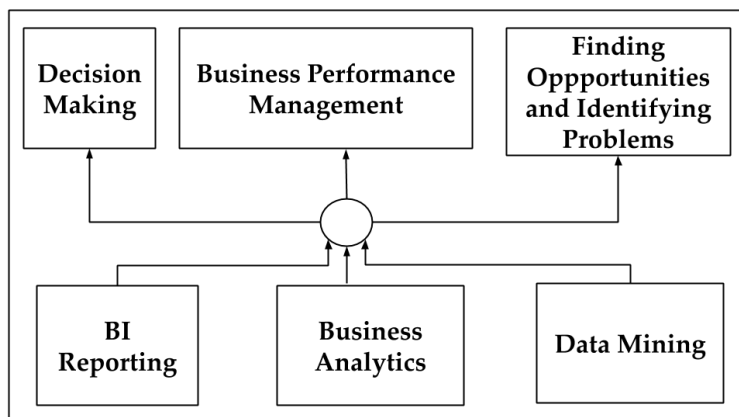

Figure 2.2: *Processes that support main uses of BI*

Let's go through each of the three processes in detail to understand what it involves and how it supports in the main uses of BI.

BI reporting

BI reporting refers to the process in which BI reports are designed, developed, and delivered to decision makers. It provides a quick and comprehensible overview of the business. In BI reports, data is organized into information summaries with KPIs, business metrics, charts, tables, etc. BI reports enable multi-dimensional representation of data. In this book, BI reports and BI reporting is simply termed as reports and reporting respectively unless mentioned otherwise. These reports support managers in fast decision making, managing business performance, and finding opportunities or identifying problems. BI reporting is achieved by various means such as simple static reports, dashboards, or interactive dashboards. Simple reports and dashboards maybe created by business (non-technical) users using data visualization tools as well as reporting and analytics platforms, however, complex reports are usually developed by technical people such as BI frontend developers. In some of the organizations, there is a lack of clarity between BI reporting and

operational data transfers. Unfortunately, in such cases everything that has to do with data is considered as a BI report, which creates quite a lot of unwanted difficulties in achieving the goals of BI. So, let's demystify the misconception about operational data transfer in the following section.

BI reporting versus operational data transfer

The most important difference between BI reporting and operational data transfer (sometimes referred to as operational reporting) is based on the purpose or intention from the perspective of the business entity that creates the reports. What do we mean by this? Let's assume that one of Walget's suppliers, ABC requests Walget to provide sales data of ABC's products, and Walget agrees to provide it in xml format on a daily basis. The purpose for which ABC requires the data could be for BI or non-BI (operational purposes for example, billing or reconciliation) but from the perspective of Walget, transferring the data to ABC on a daily basis is definitely not BI but simply a file transfer or operational data transfer. Any operational data transfers (sharing of data extracts) between systems even within a business entity is also not considered as BI reporting but as operational data transfer. It is important to note that operational decision making (a type in BI) is different from operational reporting. The differences between BI reporting and data transfer are captured in *Table 2.5*:

BI reporting	Data transfers
Used for one or more of the three main uses of BI—decision making, business performance management, and finding opportunities and identifying problems.	Used for operational purposes such as billing a customer, reconciliations, sharing data with regulatory authorities, transferring data to customers, suppliers, partners, etc.
Provides information and insights. Data is usually summarized in charts, tables, KPIs, metrics, etc., and presented as information.	Provides data. Data is usually in the lowest possible granularity (at event or transaction level). The number of records could be in hundreds to millions or more. The point to take away is that it is not fit for direct use by decision makers.
The user or recipient of a BI report is a human (a business decision maker) and not an application or a system. Reports must be in a human readable format and must be easily comprehendible by a business user.	The recipient is usually not a human unless it is a case where the process lacks automation. A non-BI report or data extract is meant for machines, so it should be machine readable.

Delivered via interactive portals such as intranet, SharePoint, emails, BI reporting, and analytics platforms in the form of static reports, dashboards, or interactive dashboards.	Delivered via FTP or SFTP or other similar means in formats such as csv, xml, JSON, etc.

Table 2.5: BI Reporting vs Operational Data Transfer

It's important to note that operational data transfer has been excluded intentionally from main uses of BI. This is because operational data transfers such as providing data extracts or dumps to regulators, partners, customers, suppliers, etc., is not the main use of BI, in fact in most cases a misuse of the BI solution to coverup the shortcomings of other solutions. Just because BI solutions have clean data doesn't mean that BI solutions and BI teams should be misused for operational data transfers. This issue is listed in *Chapter 7: Ideas for Success with BI*.

Analytics

There are so many interpretations of analytics that it's hard for one to not be confused. You will notice that there are hundreds of questions in Q&A forums about differences between analytics, data analytics, business analytics, BI, and a department or a function or a domain specific analytics such as HR analytics, fraud analytics, sales analytics, web analytics, retail analytics, healthcare analytics, etc. To add to the confusion there are hundreds of blogs out there which are optimized very well for search engines (I hope someday search engines are smart enough to rank search results based on authenticity as well) and are propagating either false or partial information. My request and recommendation to learners is, please check who is the author of the blog, what are their credentials, what is the intention of that article, who is the sponsor, and what are the sources, etc. Let's now demystify analytics.

Analytics as an umbrella term is another name for BI.[29] What academics refer to as analytics, IT professionals refer to as BI. Analytics in short refers to business analytics[30][31] or data analytics. Note that "*business*" is not limited to commercial enterprises and as explained in the previous chapter it is used in its generic sense. Hence, our first conclusion is that analytics, business analytics, and data analytics are used interchangeably and all three mean the same. When any of these three terms are used in the broader sense, we'll be referring to BI in this book.

When analytics is considered as a process within BI, that is in the narrow sense, it excludes reporting and data mining. It is the process of deriving insights through analyzing and exploring data and information. It is a quantitative and fact-based analysis to answer specific questions (asked by business users) and carrying out predictions. In this case, analytics is classified into three types, descriptive, predictive, and prescriptive analytics.

Descriptive analytics is about slicing, dicing, and analyzing a subject or a recurring event in every possible dimension and understanding the influence of each dimension independently and in combination. While reporting deals at macro level and high-level summaries, analytics deals at a micro level. When analytics are prefixed with a department, function, domain, or sector then they are specific for that respective department, function, domain, or sector. Google Analytics as of writing is an example of descriptive as well as web analytics. In the future Google Analytics could include predictive and prescriptive analytics.

Predictive analytics is about using insights from descriptive analytics to predict future behavior of a subject or an event. For example, the price of car insurance offered to a customer could depend on the likelihood of a customer meeting with an accident based on their past driving data. As we are going through the COVID times, let's look at one example using COVID data. *Figure 2.3* showcases an interactive dashboard that can be considered as a starting point for both descriptive and predictive analytics.
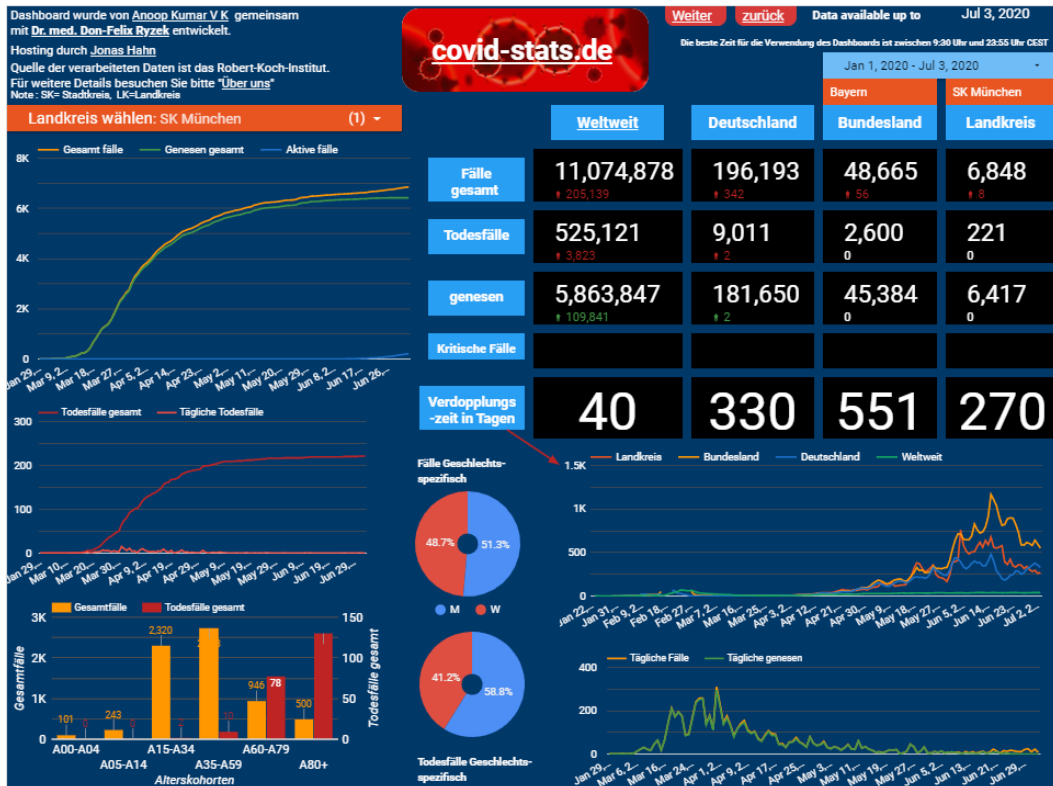

Figure 2.3: *Example of descriptive and predictive analytics, source: covid-stats.de*

If we look at the **covid-stats.de** dashboard in *Figure 2.3*, we can see both descriptive facts about Germany's COVID-19 cases such as number of people infected (Gesamt

fälle) with COVID-19, number of deaths (Todesfälle), distribution by gender (the pie charts in the dashboard) and by age (Alterskohorten), and predictions about the doubling rate (Verdopplungszeit in Tagen, that is, doubling rate in days) based on current trends.

Prescriptive analytics refers to using data-driven insights for decision-making to select the best option that would lead to desired outcomes. The results of prescriptive analytics influence operational processes. For example, the price of flight tickets, hotel rooms, fees for credit card maintenance, etc., are priced based on optimization methods used in prescriptive analytics.

Data mining

In data mining, the data analyst (data miner) digs into heaps of data without a predefined question, uncovers hidden trends, patterns, anomalies, correlations and presents this new-found information and insights in an informative way to the business stakeholders, sometimes along with recommendations for the next steps. There after it is left to the decision makers to decide what they would like to do with the new-found insight. Data mining is defined as process of efficient discovery of valuable, non-obvious information, and insights from a large collection of data. Data mining is important because business users may not always ask all the possible questions, there could be some unasked questions or some dimensions that have been overlooked. So, the approach is to find patterns, trends, and correlations that are not apparent and are unknown and then figuring out what to do with that new information and insights. There are no predetermined goals other than a generic idea to mine the data.

Data mining may not always result in uncovering new insights. The approach is to try and find every possible hidden information and insight and extract as much value as possible from data. If there are no new findings, the process carried out is documented and the activity is closed. In case there are some findings from the data mining process, the BI analysts/data analysts' hand over the findings and recommendations to relevant business managers. Business managers then figure out how this information and insight can be used for cross-selling, upselling, improving efficiency, closing revenue leakages, decreasing customer churn (number of customers lost), targeted marketing, etc. If the cost of implementation is too high and **return on investment** (**ROI**) is negative they may even drop the idea or postpone it and carry out further analysis to find something more viable.

All three processes, reporting, analytics, and data mining support each of the main uses of BI as well as influence each other. A finding from the data mining process could trigger further analytics work to be carried out or a new metric or KPI to be added in the standard reports. Information spotted in a report may trigger further

analytic work. In the next section, we will look at the differences between reporting, analytics, and data mining.

Reporting versus analytics versus data mining in BI

In the previous sections we have covered the details about reporting, analytics and data mining in BI. The differences between BI reporting, analytics, and data mining is provided in *Table 2.6*:

	Reporting	Analytics	Data mining
Process	Reports are designed, developed, and delivered to decision makers to provide a quick and comprehensible overview of the business. Often, the information and insights are fed or pushed to the decision makers instead of them creating it or actively getting it themselves.	Analysts and decisions makers explore data and information to gain insights. It is an interactive and iterative process. They use insights to predict future behavior and prescribe decisions that is expected to lead to desired outcomes.	Analyst (data miners) discover hidden information and insights and pass it on to decision makers (usually business managers).
At the start	Metrics and KPIs are predefined and agreed upon before reports are produced.	Focuses on specific and known business problems or issues. For example, finding out current customer churn rate or fraud rate and reducing it by 2%.	Problem is not defined. Finding hidden patterns, trends, and correlations that are not apparent and are unknown. Figuring out what to do with that new information and insight.

How	Decision makers are provided with reports, data is organized into information summaries with KPIs, business metrics, charts, tables, etc. Simple reports maybe created by non-technical users but complex reports are developed by technical staff.	Interactive dashboards with drill down/up, filters, etc., could be a starting point. Business users are able to use these. However, there is no upper limit on the tools used, it depends on the amount and complexity of data to be analyzed. Both statistical and machine learning models are used. Specialists are required.	Simple analysis of data is not considered as data mining as that level of analysis is already covered in reporting and also in the initial stage of analytics. So, data mining is for the technical specialists such as data analysts and not for non-technical users unless they are supported by no-code data mining tools. The tools used in data mining are similar to those used in analytics.
Level of data	Mainly deals with macro level data to derive macro level information and insights. **Example**: Walget store level information such as total sales per day, profit, number of customers, number of employees, utilization ratio, number of products sold, stock levels, etc.	Deals with micro level data to derive micro level information and insights. **Example**: Walget customer data analytics. Buying patterns, choices, what influences customers' purchasing choices, which age group prefers what and when to purchase, how will a certain type of marketing impact the buying choices of the customer, etc.	Deals with micro level data to derive micro level information and insight. **Example**: An analyst mines log files of all Walget store servers. No reports are available, no metric and KPIs have been defined, no specific questions have been asked. Analyst discovers a pattern that every Wednesday morning the servers across a region are reaching 80% CPU capacity. An analyst mines customer purchase data and finds a pattern that more than 80% of the customers who bought paint churned out (stopped visiting the store) within a month of buying paint.

Level of decision	Macro level business decisions. Example, which location should be considered for the next store?	Usually, decisions that deal at a micro or operational level such as event, transaction, or instance of a subject. For example, identifying, marking, or blocking fraudulent transactions based on past data.	Depends on the outcome of the data mining process. Some findings may result into changes at the macro level and others at micro level.

Table 2.6: Reporting vs analytics vs data mining in BI

Though there are differences between reporting, analytics and datamining as provided in the *table 2.6*, in practice, we can see that there is a lot of overlap between these processes. And a lot of people use one of these processes when they actually mean to use the other. There are also misconceptions that a report should only have past data and that it is not as important as analytics. There is no such limitation, and it is wrong to assume that reporting is less important than analytics. For example, one of Walget's store manager would like to know the sales forecast for one of the products. However, he is not familiar with the tools and lacks time, so he requests a data analyst to provide him with a report. The data analyst analyzes the past data, builds a prediction model, and deploys it as part of a report. The store manager receives the report everyday with the sales forecast. The report that he received in his email is of course static, but it does contain predicted values. If the analyst would have deployed an interactive dashboard instead of a static report, the store manager would've been able to use it interactively. The point is, reporting doesn't always refer to past data. Also reporting is no less important than analytics and data mining. In fact, if an organization hasn't already built the basic reporting capabilities, all this talk of analytics and data mining are nothing but a fantasy.

Importance of BI

How important is BI for a business? What if there was no BI? In this section we will take a look at the importance of BI. Simply put, BI to a business is equal or more important than a dashboard in a car.

Figure 2.4: BI to business is like a dashboard for a car

Yes, BI to business is equal or more important than a dashboard for a car. The more intelligent the car dashboard is, the better results you get. Can a car be driven without a dashboard? Yes, it can be. Can a car be driven better when there is a dashboard that shows you how you are driving? How is the car performance? How much fuel is left? etc., Yes. This is exactly what BI delivers to businesses. It delivers useful information using which businesses can be run better.

Businesses can obviously run without BI, however, with BI they can run better. And in this competitive world where there is a need for businesses to operate better than their competitors, there is definitely a need for BI.

Just like the dashboard of a car indicates the speed at which the car is going, what is the optimum speed, in how much time you will reach your destination, etc., BI indicates how the business is performing and gives a sense of how it will perform in the future based on past trends. This information allows managers to take necessary actions to achieve the objectives of the business.

For a moment, just imagine that there was no fuel level display in the dashboard, the driver would have to every so often come out of the car and manually check if there is enough fuel. By automating the process of continuously measuring the fuel level and displaying it on the car dashboard, makes it available to the decision maker, the driver in this case to whether visit a fuel station or not. It not only saves time but also spares the stress, anxiety, worry, unnecessary stops, delays, inefficiencies, and possible accidents due to car running out of fuel abruptly. Similarly, BI not only

saves time (easy to measure benefit) for the decision makers but also has intangible benefits such as sparing decision makers the stress, anxiety, worry, unnecessary breaks, delays, inefficiencies, possible shutdown due to running out of resources abruptly.

Note that we have used a couple of keywords in the above paragraph—measure and automation. If you think about it, at a fundamental level, BI is all about measuring. It is about measuring the performance of the business so that it can be improved. The famous quote "*if you can't measure it, you can't improve it.*" by Peter Drucker, a popular management consultant, educator, and author fits perfectly here. BI acts as a measuring tool for a business. How can managers manage something well or improve it if they don't have an overview or if they can't comprehend it? BI helps managers comprehend the business by giving them a complete overview. This could have been done manually as well just like a driver can manually check the fuel level, but then if the managers spent all their time manually measuring (collecting required data, storing it, securing it, putting it together, analyzing it) they wouldn't have the time to do anything else or have less time to do their main job. That's where BI comes to rescue and supports managers. Having a BI solution means that there is enough automation to ensure that all of the data collection, storage, and integration is taken care of and that the data is ready for analysis and decision-making. So, the whole point of BI is automating the process of deriving information and insights from data.

Now let's run through a couple of questions again. Can businesses exist without BI? Yes, they can, and they do. Can businesses be profitable without BI? Yes, they can be. Can businesses grow from a small company to a large company (more than 250 employees and $100 million US dollars revenue) without BI in this generation? Probably not. If a small company wants to scale to a large company, then the business needs BI.

My effort [20][21] to find companies that don't use BI but reached yearly revenue of more than $100 million US dollars led to zero results. I couldn't find a single company which meets that criteria. On the other hand, we can find thousands of small businesses which have never used BI. That finding tells us that BI is required for growth, for scaling the company to a large company. If it's a very small business for example, one where a single person running a mom-and-pop store or a single person with a small office, where the owner himself/herself has direct contact with every customer and the owner is available for the customers at all times, is able to listen to the customers' feedback directly, and monitor the business then there probably is no need of a BI solution outside of the owner's mind as the owner knows what to buy and store, what to sell, what to offer, which customers he should give special offers, which customers can be trusted with credits, which products are moving fast, which products have more margins, etc. BI, in the way we know it, is needed only if there is a plan to grow the business and to run it efficiently. In

case of Walget, it simply cannot run efficiently and grow without BI. The top-level managers need to know which locations are performing well and where to invest. The store manager needs to know which products to stock up and when. BI is highly important and a critical capability for any business. In fact, it is a must have as we will see in the next section.

Why BI is a must have?

In the 90s and early 2000s mainly large companies invested in BI projects and programs. BI had become a "*must have*" for large companies because of competition. Whereas for an **SME** (**small and medium enterprise**) it was a "*good to have*" as most SMEs couldn't venture into a BI program due to the barriers of high costs and long implementation times. Now the situation has changed, even SMEs consider BI as a "*must have*". Reason for this shift from "*good to have*" to "*must have*" can be attributed to the factors listed in *Table 2.7*:

Factor	Description
Lower costs and cloud solutions	The cost of data acquisition and data storage has drastically reduced thereby enabling most organizations to store almost all of the data that they think could be utilized.
	With several variants of cloud solutions, it is now possible for businesses to start BI programs with minimum **capital expenditure** (**CapEx**) or without any CapEx, and with very low operating costs compared to traditional on-premises approaches.
Open and free source software	Several open and free source software is available that fulfil various functions in the BI process. This enables smaller companies to start their programs without much cost.
Outsourcing	As the outsourcing model has expanded to various functions of a business, companies started outsourcing BI projects too, thereby bringing in a greater number of specialists, and hence reducing the timelines and costs.
Competition	As more SMEs adopt BI solutions for competitive advantage, all businesses must adopt BI solutions to compete.
Proof of successful implementations	There are many examples of successful implementations of BI and the advantages it has provided to businesses in every sector. The resistance within businesses in venturing into BI programs has considerably declined, if not totally ceased.

Table 2.7: *Why BI is a must have for most businesses?*

Benefits of BI

The overall intended benefit of BI is improvement in business, whatever the business might be. If a BI solution is not bringing improvements in business, then there is absolutely no point in continuing with that solution. The need for BI and its importance should be clear by now, BI is a necessity to improve the business, it is required for business to scale. Let's now see some of the benefits offered through BI solutions:

- Ensures information is provided to the right person at the right time in the right format. Back in the old days it was a problem of not having enough data, but now, while there is no dearth of data, there is lack of high-quality business critical information. It is challenging to identify the right set of data and then getting to the right data and information because of the overwhelming amount of data captured and processed in the business. BI abstracts the complexity and provides the much-needed information and insights to the decision makers.

- Tracks KPIs and metrics related to various stakeholders of the business such as customers, employees, partners, suppliers, distributors, and competitors.

- Supports management to understand all parties involved in the business better, to understand what's happening in the business and be on top of the business and manage business better.

- Ensures that all stakeholders involved in the business get consistent information, that is, information should be consistent across departments and functions. Anyone who has been in business is aware of data inconsistency issues, for example, data about a subject area that the controlling department has is different from that of what marketing has for the same subject area which is totally different from what sales has.

- Ensures data is reliable by processing (cleansing, transforming, harmonizing, etc.) it before use.

- Enables data-based fact-based decision making across the enterprise at all levels.

- Enables data-driven insights to action approach.

- Enables faster and better reporting process.

- Improves efficiency across the organization.

- Enables businesses to be competitive.

- Supports in reducing costs and expenditure while increasing revenues.

- Supports in identification, prevention and stoppage of revenue leakages.

- Enables businesses to find growth markets, products, and services.

- By tracking key metrics related to regulatory and compliance mandates it de-risks the business.

- Allows decision makers to focus on their core work and use information as and when required instead of running behind people to gather data and information at the eleventh hour.

When we review each of the details of benefits listed, we find that every single point leads to improvement of the business.

Side benefits of BI

Apart from all of the specifically intended uses there are also some very important and interesting side benefits that businesses can achieve by adopting BI solutions. These are called side benefits because the original plan may not have included these as benefits of a BI initiative or the primary goal of the BI implementation could be something else. There can be some overlap between what we have seen in the benefits of BI and the side benefits of BI, the point I am trying to convey is that, whether a business intends to achieve these benefits or not, it will anyway get these benefits if it implements a BI solution. *Table 2.8* lists some of the side benefits:

Side benefits	Description
Reduction in fraudulent activities	Fraudulent activities by employees, customers, suppliers, etc., are hindered because of increase in transparency. For example, assuming that Walget store had no BI, the management wouldn't be able to figure out if the Walget store manager partnered with some suppliers for his own personal gain at the cost of Walget's loss.
Detecting revenue leakages and inefficiencies	As part of the BI process, a business may uncover some revenue leakages and inefficiencies in processes and people. For example, at Walget store it could identify that some of the perishable products were over ordered, lost track of in the warehouse and under sold.

Improvement in data quality Increase in compliance	To provide an overview to the management the quality of data has to be good. This inherent requirement to bring data to a high-quality state drives change in the organization. Processes which previously remained unchanged are updated and upgraded to meet better data quality requirements. Better data quality ensures that a business is better equipped for audits and also raises the level of compliance. Better quality data ensures that the decisions that are made are made right.
Better equipped for audits	
Financial health transparency	Financial health of a business will be transparent to all authorized stakeholders. There are businesses where the employees, including middle level management, have no clue about the financial health of the line of business they are in when there is no BI.
Reduction in data hoarding and reducing delay in access.	By implementing BI programs, the right people (even those who join later) get the right information at the right time and therefore reduce data hoarding cases. For example, it will become difficult for employees of one business unit to block access to data of employees from other business units. With BI, as processes are established and automated, it ensures that the right people have access to the right set of data and are not denied access because of corporate politics or professional jealousy.
Better utilization of other teams	Any other teams that were inefficiently used in an unplanned manner to resolve ad hoc requests for getting information out from source systems can now focus on their core work as BI takes care of all information needs efficiently. For example, in some organizations, the database administrators (DBAs) have no choice but to query the databases to answer ad hoc questions from management. And therefore, it takes away DBAs time and focus from their core work. With proper BI solution in place, DBAs and other such teams can focus on their core work.
Customer communication and notifications	As part of a BI solution, data is usually cleaned and centralized. Marketing teams could use this clean data to communicate with customers and avoid missing out some customers or sending duplicate communications. For example, Walget would like to target those customers who have bought a particular product between certain dates to inform them about a problem with that product.

Using DWH data in OLTP	There is no harm in using the data collected and stored for BI purposes as an input in the online transaction processing (OLTP) process as long as it doesn't slow down or break the OLTP process. For example, the aggregate total amount spent by a customer in the last one year could be precalculated in the data warehouse and then displayed at the Walget cash counter screen for the store cashier to see and give a discount/ voucher based on the yearly amount during the purchase.

Table 2.8: Side benefits of BI

There could be several other side benefits that are not listed above. The point is, there are not just known and intentional benefits but also unintended benefits of having a BI solution in place. BI can do no harm in an ethical business. Corrupt businesses shy away from BI as it tends to expose corruption. Do all industries or sectors use BI? Let's look at this aspect in the next section.

Which sectors use BI?

Short answer to the question of which sector uses BI is that every sector or industry makes use of BI. I haven't come across a business where BI cannot be used. This answer is based on the fact that there is still a growing demand for BI professionals across industries. There are at least 3 fact-based ways to find out which businesses use BI:

1. Search BI jobs in any of the IT job portals (worldwide or any specific geography) and check which sector the business operates in.

2. Search for BI professionals in professional networking sites such as LinkedIn and find out which sector they work in.

3. Go to the website of any reasonably sized company or a company in its growth stage (growing from SME to a large company) and search for BI job openings and most likely you will find one.

In 2017, I created a report based on live BI job openings. At that point in time I found that almost every industry was recruiting people in BI positions. A random set of live 300+ jobs from *https://www.jobsbi.com* portal was considered. We can see the percentage of BI job openings across various industries as of 2017 in *Figure 2.5*.
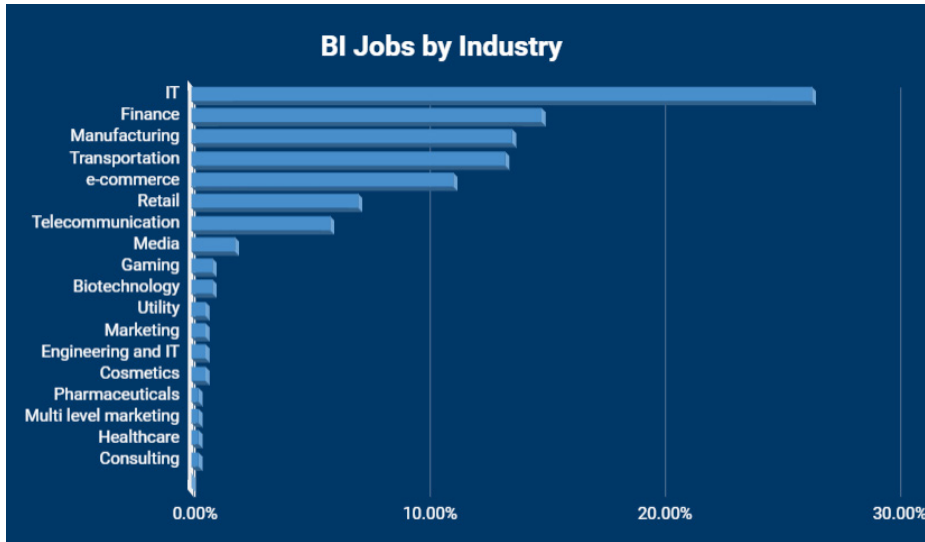
Figure 2.5: *BI jobs across various industries in 2017, Source: www.reportpedia.com*

Do note that many sectors could be missing from the above chart as the sample set considered was only 300+ jobs. Again, in April 2020 a sample set of random 200 live BI job openings across various locations were collected (to ensure that I am not biased, in both cases, that is in 2017 and in 2020 I did not collect the BI jobs on my own but outsourced it to my wife) and again it was found that there are BI job openings across almost all sectors including **non-profit organizations** (**NPOs**), fashion, insurance, FMCGs, market research, mining, staffing, tourism, judiciary, entertainment, and more. Also note that BI is used across various types of businesses, from family-owned businesses to large public companies. From **business-to-business** (**B2B**) and **business-to-consumer** (**B2C**) to **business-to-business-to-consumers** (**B2B2C**).

Opinion: In my view some form of BI is a must have for B2C and B2B2C businesses from day 1, whereas BI becomes a must have for B2B as the business grows.

Users of BI and purposes

Who are the users of BI and what are specific purposes they use it for? In this section, we will look at the list of BI users (category of users) within an organization and the specific purposes they make use of BI. This is different from the user types explained in *Chapter 1: What is Business Intelligence?* Just to refresh your memory, what we have seen in the previous chapter, in types of users is that users are categorized as beginners or basic users and power/advanced users based on the proficiency level of using the BI solution. Usually the CXOs, if they use BI solutions, are at the basic level and users such as BI analysts, business analysts, data analysts, and some middle level managers are at the power user level. Now we will look at the category of users based on the job function. Within each of these functions, the users

often include managers (for example, sales managers), heads, VPs, etc. In *Table 2.9* a few user groups and examples of purposes (use cases) are provided. This is not an exhaustive list; this is only to give an idea about the use cases for each user group.

Department	Use cases
Sales	• Tracking product, service, or program revenues • Comparing business performance across verticals, horizontals, customer segments, and sectors • Calculating and tracking commissions for sales managers
Marketing	• Campaign management • Monitoring and measuring web visits • Subscriptions and opt-in management
Human Resources	• Employee cost and utilization ratio calculation • Ensuring legal and regulatory compliance • Managing job application systems, tracking selection or rejection ratio • Forecasting growth in employee count
Finance and Billing	• Budgeting, cost centre reporting and planning • Accruals management • Profit and loss reports • Revenue management
Product/ Service Management teams	• Monitoring product or service performance • Comparing across product/service categories • Prioritizing product and service development
Account Management teams	• Monitoring account performance • Revenue tracking and comparisons across accounts • Prioritization of accounts

Operations	• Incident ticket backlog management and prioritization
	• SLAs management
	• Tracking call centre stats
	• Tracking technical performance indicators
Compliance	• Tracking compliance
Higher management	• Overall business management

Table 2.9: *User groups and example use case scenarios*

It is important to understand that even within these user groups mentioned in *Table 2.9*, there could be 2 sets—direct users and indirect users. For example, in some companies some of the CXOs may prefer not to directly use a BI dashboard due to lack of time and instead prefer to delegate it to their subordinates or analysts and get the required information from the delegates. So, in this case CXOs are indirect users of BI whereas the analysts and other delegates are direct users of BI.

The main part of this chapter ends here. Now that we have covered the topic of main uses of BI, the importance of BI, and user groups of BI, we will be able to understand the evolution of BI as explained in the following section.

Evolution of BI

Evolution of BI is actually quite a complicated topic. If you search for references related to evolution of BI, you will find that you are directed in so many different directions and that there are quite a lot of inconsistencies between the explanations. This is because there is still no clear agreement in the industry about what exactly fits within BI and what is outside the scope of BI. As there is no clear agreement on what is in scope of BI and what is out of scope, how can anyone correctly provide the details for its evolution?

That's why it is important to first establish what concepts actually come under the umbrella term BI so that we can connect back to its roots in a more meaningful way. And this is exactly what we have achieved with the current flow of contents. In the previous chapter, we covered the definition of BI and busted a few myths, and in this chapter, we covered the various purposes for which BI is used currently, the processes that supports those uses, and groups of BI users among other topics. This gives an understanding of what comes under BI without limiting your understanding to a specific technology or tool.

A different approach has been followed in this book. We have not dealt with the technology concepts such as OLAP, ETL, data warehouse, data mart, data integration,

data visualization, data virtualization, etc. Some people go wrong in understanding BI because they directly connect or limit a concept to a specific technology or to a specific tool that they have dealt in one organization. And the problem with that approach is that once you connect a concept in a limited way to a specific technology or to a specific tool then every other technology or tool seems to fall outside of the concept even though in reality it very much fits within the concept. By limiting a concept to a specific tool or technology, the evolution is incorrectly traced back on the basis of the tool or technology and not on the basis of the concept. As we have dealt extensively on the concept of BI in the first chapter and in this chapter, it gives you a solid foundation to build on and explore further based on the concepts in an unbiased way.

In the 1980s, **Executive Information System** (**EIS**) was developed which takes its roots from the **Management Information System** (**MIS**) and **Management Decision System** (**MDS**) of the 1960s. Note: Even in 2010, BI systems in some companies were still being referred to as MIS. Data Warehousing replaced EIS. EIS was meant to be used only by executives (top management) of the organization, it died for lack of an underlying infrastructure that should have supported the fancy frontend screens. [13] The original name for data warehousing was Decision Support System.[10] In the 1990s, data warehousing, which forked out from the **Decision Support System** (**DSS**) as data-driven DSS, became **Data Warehousing and Business Intelligence** (**DW/BI**).[11] As BI was used as an umbrella term, data warehousing became a part (subset) of BI, and the discipline of DW/BI came to be known as BI. The promoters of DSS considered BI as data driven DSS[1]. Now there is an ongoing endeavour by market players to state so-called big data analytics as the evolution of BI. In the *chapters 9 and 10* we will learn more about the topic of data warehousing. For now, just have it in mind that BI solutions can be backed by a data warehouse, and that there are BI solutions that don't have a data warehouse.

Over the years a lot of changes have taken place related to technology, tools, and architecture of BI, however, the overall concept has remained the same. BI is still a generic term used to describe the process of leveraging an organization's internal and external information assets for making better business decisions[10] and managing businesses better. The sizes of most data warehouses are now in terabytes range if not petabytes from just gigabytes in the 1990s. *Table 2.10* lists some of the major changes from the 1990s. The table does not indicate that all of the new functionalities replaced all of the older ones but that they mostly complemented older/existing functionalities. We will cover most of these changes as we go through various topics in the following chapters.

From 1990	**From 2000**	**From 2010 to now (2020)**
• Data warehousing • OLAP • Dimensional modelling • Static reports on portal • Desktop based software • Mainly hand-coding of ETL flows (ETL tools from mid 1990s) • Corporate Information Factory	• Mainly ETL tools instead of hand-coding ETL flows • Web based reporting tools • Data Warehouse Appliances • Data Vault • Embedded BI • Dashboards • Semantic layer • OLAP (ROLAP, MOLAP and HOLAP) • Real-time BI • Agile BI • Off-the-shelf subject-specific or tool-specific BI • Self-Service BI • Analytics • BI for all • Using output of BI not only for decision making but also for recommendations • Data Virtualization • Conformed Dimensions • Master data management	• Mobile BI • Columnar, and NoSQL DBs • Cloud BI (BIaaS, DWaaS and other combinations) • Data visualizations and data discovery tools • Advanced analytics • Data Lake • Automated and Augmented Insights • Machine Learning capabilities • Integration with R packages and other tools • Google-like search functionalities • In-memory DBs • Translytical data platforms • Analytics and Business Intelligence • Voice-based analytics • Data culture • Data literacy • Social media data • IOT data

Table 2.10: *Some of the major changes in the evolution of BI*

Note that the term "*big data*" has been intentionally excluded from the list above because big data is actually nothing more than a marketing term, it's a buzzword with no specific definition and just a vague definition of 3Vs and 5Vs using relative terms. For BI, as we have seen in the previous chapter, all data (including so-called big data) from which information and insight can be derived is considered as input in the BI process and therefore all data is considered as data.

Conclusion

In this chapter, we have covered the main uses of BI and the importance of BI has been highlighted. We have briefly covered the differences between analytics and the data mining process within BI and have demystified the misconceptions about data analytics, business analytics, etc. We have also introduced Walget as an example to be able to relate concepts to a particular business. Apart from the main benefits of BI, the side benefits of BI have also been covered. It is clear that businesses need BI, all businesses of all types in every industry and sizes need BI, and for almost every role within an organization there is a BI use case. By first focusing on the concepts, we were able to trace the predecessors of BI and understand the evolution of BI better. I hope this chapter motivates some of the business owners to consider implementing BI to put their business on a fast track. If you're not sure about which type of BI you should consider, it will be clear in the next chapter, as we will discuss about the types of BI and variants of BI in the next chapter.

Points to remember

Some of the key points to remember are listed as follows:

- All KPIs are metrics, but all metrics are not KPIs. There can be 100s of metrics for a business, however, usually less than 10 KPIs.

- Three main uses of BI are decision making, managing business performance, and identifying problems or finding opportunities.

- There is a difference between business performance monitoring and business goals achievement tracking.

- BI is used for all types of decision making.

- Reporting, analytics and data mining supports decision making, managing business performance, and identifying problems or finding opportunities.

- Operational data transfer is not same as BI reporting.

- Business analytics, analytics, and data analytics are one and the same.

- When used as an umbrella term, business analytics is same as BI.

- Analytics is classified as descriptive, predictive, and prescriptive.

- Data mining is about discovering previously unknown information and insights from large amounts of data.

- Businesses can exist without BI, especially very small businesses such as mom-and-pop stores.

- With BI, businesses can run better.

- In simple terms, BI is nothing but automation of the process of deriving information and insights from data.

- The number of benefits of BI outweighs any disadvantages (if any).

- There are a few side benefits but important benefits of BI.

- BI is now a must have for most businesses. Almost every kind of business in every sector uses BI.

- BI traces its roots to a combination of data warehousing, DSS, EIS, MIS, and MDS.

Multiple choice questions

1. **Businesses use BI for**
   a) Decision making
   b) Business performance management
   c) Finding opportunities and identify problems
   d) All of the above

2. **BI is used for decision making of which types**
   a) Only strategic decision making
   b) Strategic, tactical, and operational decision making
   c) Only tactical
   d) Strategic and tactical decision making

3. **A Walget store wants to decide which day they should start the sale (discount offer), which type of decision does this fall into?**
   a) Strategic
   b) Tactical
   c) Operational
   d) None of the above

4. **A Walget store missed the daily sales target, which part of business performance management will definitely address this?**
    a) Business performance monitoring
    b) Business goals achievement tracking
    c) Both of the above
    d) None of the above

5. **Can any business exist and be profitable without BI?**
    a) No, not possible at all
    b) Yes, in most cases
    c) Yes, in some cases
    d) None of the above

6. **Which one is the most correct about data-driven organization?**
    a) All decisions are based on BI
    b) No decisions are based on BI
    c) Some decisions are based on BI
    d) Most decisions are based on BI

7. **Reduction in fraudulent activities, is this an intended benefit or unintended benefit/side benefit of BI for a business?**
    a) Intended benefit
    b) Unintended benefit
    c) Always unintended
    d) Both intended and unintended benefit

8. **KPI stands for?**
    a) Key performance intelligence
    b) Key performance indicator
    c) Key performance information
    d) Key performance insight

9. **In case of Walget, how would you classify "Number of products sold"?**
    a) A key performance indicator
    b) A performance indicator
    c) A metric
    d) Any of the above

10. **Nielsen supplies market data to Walget on daily basis, from Nielsen's perspective, this is considered as?**
    a) Business intelligence
    b) Analytics
    c) Operational data transfer
    d) Any of the above

11. **Google Analytics is an example of?**
    a) Descriptive Analytics
    b) Web Analytics
    c) Business Intelligence tool
    d) All of the above

12. **Data mining is carried out by?**
    a) Data analysts
    b) BI report developers
    c) Data warehouse developers
    d) All of the above

Answers

1. d
2. b
3. c
4. b
5. c
6. d
7. d
8. b
9. c
10. c
11. d
12. a

Questions

1. What are the 3 types of decisions under decision making? Give one example for each.

2. What are the 3 main uses of BI? Explain with an example.

3. Why some of the businesses don't use BI for all 3 main uses of BI?

4. What are the differences between metrics and KPIs?

5. What is the difference between business performance monitoring and business goals achievement tracking?

6. What are the differences between reporting and operational data transfer?

7. Differentiate between reporting, analytics, and data mining.

8. What is the point in data mining when we already have BI reporting and analytics?

9. Can any business exist without BI? If yes, then why do we need BI? If no, why not?

10. What sets of data is stored in a traditional bank? Create a table similar to *Table 2.2*.

11. What are the side benefits of BI? Why are they grouped under side benefits when they can also be considered under benefits?

12. Why has BI become a "*must have*" even for SMEs?

13. What was the reason for the failure of EIS?